Dendrothrix, a New Generic Concept in Neotropical Euphorbiaceae

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ABSTRACT. The new genus *Dendrothrix* is proposed. Two of its species are new to science, the third one was originally allied to *Sapium*. Keys for distinguishing related genera using flowers, fruits, and leaves are provided, as is a key to the species of *Dendrothrix*.

A taxonomic revision of the subtribe Mabeinae Pax & K. Hoffmann of the Euphorbiaceae (tribe Hippomaneae A. Jussieu ex Spach) has necessitated the establishment of a new genus in order to accommodate species that have confused students of the Euphorbiaceae for some time. The three species are known from northern Brazil and Venezuela.

Dendrothrix Esser, gen. nov. TYPE: *Dendrothrix yutajensis* (Jablonski) Esser.

A ceteris generibus tribus Hippomanearum differt pilis ramosis, foliis integris subtus papillis obtectis sine glandulis marginalibus praeter bases glandulosas, thyrsis regulatim plerumque semel ramosis, glandulis bractearum disciformibus vel cyathiformibus, floribus masculinis bistaminalibus cum filamentis tota longitudine connatis, ovariis pubescentibus, et mericarpiorum septis filo vasculari furcato vel duplici instructis.

Trees or shrubs. Hairs multicellular and ramified. Leaves alternate, simple, coriaceous, entire; abaxial epidermis minutely but densely papillose; without petiolar, submarginal, or marginal glands but abaxially with a pair of basimarginal glands and sometimes with laminar glands of 0.2–0.35 mm diam.; petioles 1.5–5.5 cm long. Stipules very small to absent. Thyrses yellowish to cream-colored, terminal, always compound, mostly with one order of branching with several lateral thyrses, bracts small, scaly, glandless. Male cymules distal, at least 8-flowered, their bracts carrying basal glands which, when dry, are cup-shaped or disc-shaped and ± 1 mm long; bracteoles absent. Staminate flowers sessile, at anthesis with 0.6–1.0-mm-long pedicel, subtended by a two-parted calyx fused for most of its length; stamens two per flower, connate, lateral flowers often unistaminate; anthers 0.4 mm long, filaments at anthesis slightly longer than anthers. Female flowers proximal, bracteolate, shortly pedicellate, tricarpellate; sepals three, partly fused; ovary pubescent; style short but evident. Fruit a septicidal schizocarp, smooth, with scattered, caducous pubescence, glabrescent, up to 6 mm long. Mericarps bearing one bifurcate or two distinct vascular strands visible on each septum, leaving an inconspicuous alate central columella. Seeds dry, brown, smooth, carunculate in two species (not known in *D. multiglandulosa*).

The name of the genus refers to the treelike branched hairs, which are unusual for the Euphorbiaceae.

This genus differs from the other three neotropical genera of the Hippomaneae with compound thyrses in both its bistaminate male flowers and its totally fused filaments.

The inflorescence is similar to that of *Senefelderopsis* Steyermark: the thyrses are of the same size and are strictly terminal. A single, and rarely a second, order of branches occur, always subtended by small scaly bracts, and the staminate cymules are many-flowered. The two genera therefore can be confused superficially. However, the hairs of *Senefelderopsis* are multicellular but unbranched, the bracteal glands of its two species are always cylindrical when dry, the staminate flowers carry persistent bracteoles, and its fruits are larger (length 15–25 mm) and have a leathery outer layer. Additionally, the leaves of *Senefelderopsis* exhibit a row of abaxial submarginal glands and a pair of adaxial basal glands.

The hairs and fruits of *Dendrothrix* are very similar to those of *Mabea* Aublet. The leaf glands of *Mabea*, however, are strictly marginal or submarginal, never laminar. The lateral secondary thyrses of *Mabea* occur irregularly (they are missing in many species, whereas in others they can be several times compound), and the staminate cymules are mostly 3-flowered. The calyx of pistillate flowers and fruits consists of six sepals. *Mabea* always shows a single undivided vascular strand on each septum of the mericarps, the length of the capsules always exceeds 8 mm, and its indumentum is very dense and persistent.

Senefeldera C. Martius, the third other genus with compound thyrses, is quite different, e.g., it

has unbranched hairs, leaves without abaxial papillae and without basimarginal glands, bracteolate staminate cymules with 1–3 flowers each, mostly glabrous ovaries, and larger fruits.

The following keys should facilitate the distinction of the neotropical genera with compound thyrses:

KEY FOR CHARACTERS OF FRUITS

1a. Fruits, excluding style, up to 6 mm long .... *Dendrothrix*
1b. Fruits, excluding style, at least 7 mm long 2
  2a. Ripe fruits with fleshy outer layer that wrinkles when drying ..... *Senefelderopsis*
  2b. Ripe fruits dry, not wrinkling 3
    3a. Fruiting calyx of 6 sepals; fruits with dense indumentum of shortly papillose or branched hairs ..... *Mabea*
    3b. Fruiting calyx of 3 sepals; fruits glabrous or covered with long unbranched hairs ..... *Senefeldera*

KEY FOR CHARACTERS OF STAMINATE FLOWERS

1a. Staminate cymules with many (≥ 6, often ≥ 10) flowers each 2
  2a. Glands of bracts of staminate cymules cylindrical; flowers with 3(–5) free stamens each ..... *Senefelderopsis*
  2b. Glands of bracts of staminate cymules disc- or cup-shaped; flowers with 2 fused stamens each ..... *Dendrothrix*
1b. Staminate cymules with 1–5(–7) flowers each 3
  3a. Staminate flowers at anthesis inclinate or nearly sessile ..... *Senefeldera*
  3b. Staminate flowers at anthesis erect and clearly pedicellate ..... *Mabea*

KEY FOR CHARACTERS OF LEAVES

1a. Leaves abaxially glaucous or papillose 2
  2a. Leaves with adaxial basal gland(s); abaxially one row of submarginal glands ..... *Senefelderopsis*
  2b. Leaves without adaxial basal glands; abaxially with or without row of marginal or submarginal glands 3
    3a. Leaves always entire; abaxially papillose; never with abaxial row of marginal or submarginal glands, but mostly with laminar pellucid dots ..... *Dendrothrix*
    3b. Leaves often serrate; if entire, abaxially never papillose; with or without row of marginal or submarginal glands, never with laminar pellucid dots .. *Mabea*
1b. Leaves abaxially shining and smooth, neither glaucous nor papillose 4
  4a. Petiole at least 2 cm long; leaf glands laminar ..... *Senefeldera*
  4b. Petiole less than 2 cm long; leaf glands marginal, submarginal, or absent .... *Mabea*

Dendrothrix seems to be very closely related to *Senefelderopsis*. Both genera are centered in the Guayana Highland, although, interestingly, they occur only partially sympatric. *Senefelderopsis* is strictly endemic to the Guayana Highland and is widely distributed there, but is absent from its southern, e.g., Brazilian, part. *Dendrothrix*, on the other hand, has two species known only from the Venezuelan and Brazilian portion of the Guayana Highland and a third one occurring in Brazilian Amazonia near the northern margin of the Brazilian planalto. Furthermore, at least *Senefelderopsis chiribiquetensis* (R. Schultes & Croizat) Steyermark is very similar ecologically to the two Venezuelan species of *Dendrothrix*.

KEY TO THE SPECIES OF *DENDROTHRIX*

1a. Bracts of male flowers with at least two pairs of glands; mature leaves glabrous; tertiary leaf venation predominantly percurrent ..... 1. *D. multiglandulosa*
1b. Bracts of male flowers with only one pair of glands; mature leaves pubescent; tertiary leaf venation clearly reticulate 2
  2a. Leaf blades elliptic; basal lateral nerves similar to distal ones; hairs reddish when dry ..... 3. *D. yutajensis*
  2b. Leaf blades ovate; basal lateral nerves different from distal ones in length and angle of divergence; hairs pale when dry ..... 2. *D. wurdackii*

1. Dendrothrix multiglandulosa Esser, sp. nov. TYPE: Venezuela. Territorio Federal Amazonas: Cerro Sipapo (Paráque), breaks below Lower Camp Savanna, alt. 4,400 ft., 15 Dec. 1948 (fl, fr), *B. Maguire & L. Politi 27683* (holotype, K; isotypes, GH, MICH, S, U, US). Figure 1.

Species generis *Dendrotrichis* pilis pallidis ornata, foliis mox glabrescentibus nervationem tertiariam percurrentem praebentibus, bracteis cymularum masculinarum minimum duobus paribus glandium instructis.

Shrub or tree, 4 m. Indumentum pale. Leaves elliptic to obovate, (10–)13–18 cm long, 5.0–9.5 cm wide, basally cuneate to obtuse, apically acute to obtuse; mature ones glabrous; secondary veins

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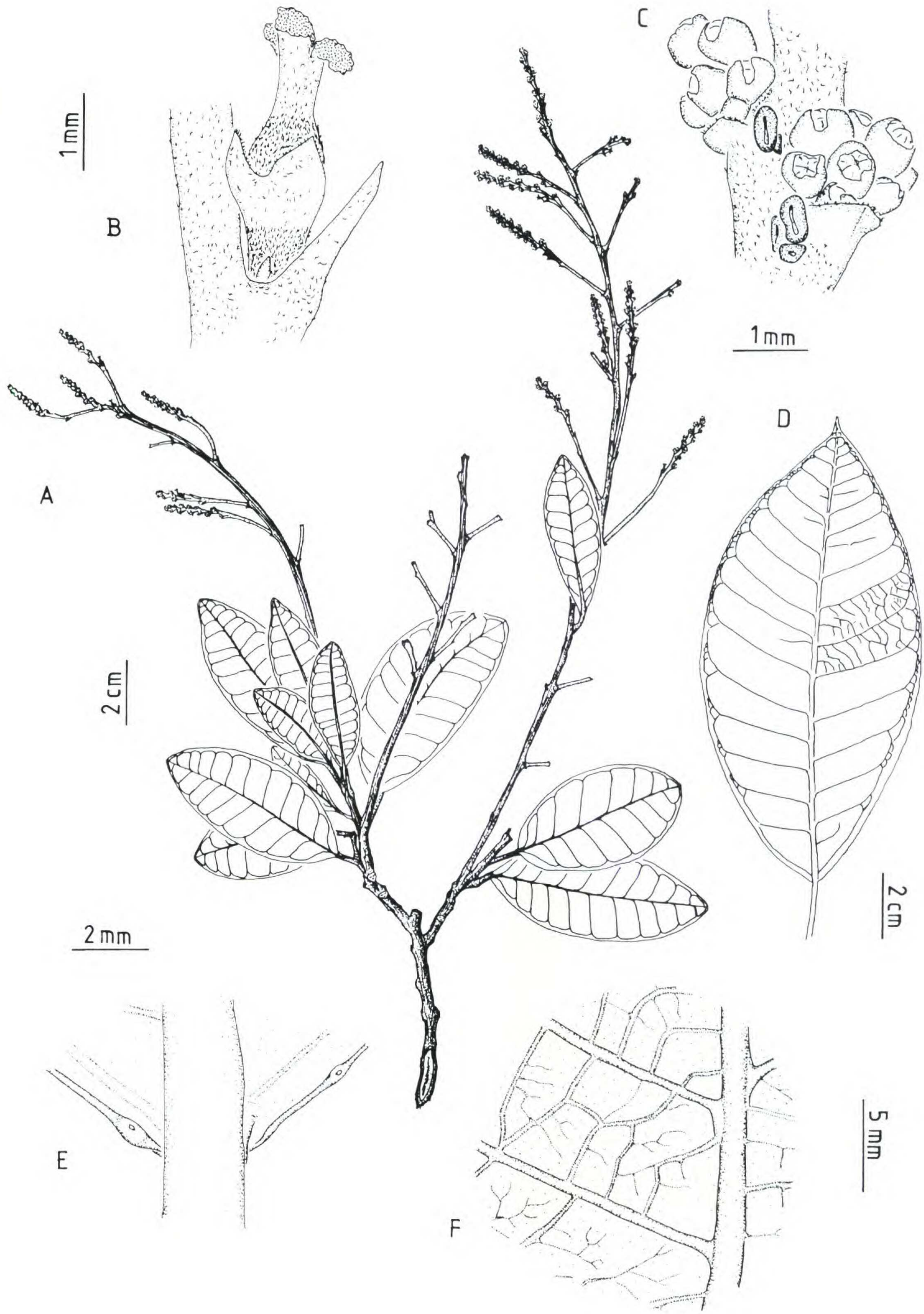
Figure 1. *Dendrothrix multiglandulosa* Esser. —A. Habit. —B. Pistillate flower. —C. Portion of staminate part of inflorescence showing two cymules. —D. Old leaf. —E. Leaf base with glands, abaxial view. —F. Detail of percurrent leaf venation. (All drawn from *Maguire & Politi 27683*.)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11–14 pairs, tertiary venation percurrent; (0–)10–25 laminar glands on each half of blade, basal glands less than 1 mm long; petioles 2.0–5.5 cm long. Stipules unknown. Thyrses with flowering part up to 14 cm long, bracts of secondary branches 1.5 mm long. Each branch bearing 1 female flower and at least 10 male cymules. Bracts of male cymules with at least two pairs of glands. Bract of pistillate flower up to 2 mm long. Pedicel of pistillate flower 1 mm long; sepals (1.0–)1.5 mm long, 1.5–2.0 mm wide, mostly ciliate; style 1.0 mm long, stigmas 0.5–1.0 mm long. Fruits 4 mm long, mostly glabrous. Seeds unknown.

Distribution and phenology. Endemic to Cerro Sipapo, and locally frequent in low bush and mixed forest; flowering in December.

Jablonski (1967: 186) used both *Maguire & Politi 27683* and *Maguire & Politi 27885* to describe the pistillate flowers of *Senefelderopsis sipapoënsis* Jablonski. He did not recognize the profound differences from this genus that are discussed above. Both collections were distributed as *Senefelderopsis sipapoënsis* Jablonski.

Differential characters for *Dendrothrix multiglandulosa* beyond those given in the key are the higher number of leaf glands and the ciliate margins of the broad, apically rounded to acute sepals of the pistillate flowers. Stipules or abscission scars could not be found. It can be postulated that the stipules have been reduced totally, much more than in the other two species of the genus.

The name of the species refers to the multiple glands of the bracts of the staminate cymules.

Paratype. VENEZUELA. **Territorio Federal Amazonas:** Cerro Sipapo (Paráque), North Escarpment, alt. 1,400 m, 23 Dec. 1948 (fl), *B. Maguire & L. Politi 27885* (S).

2. Dendrothrix wurdackii Esser, sp. nov. TYPE: Brazil. Amazonas: Rio Aripuaña, Nova Prainha, Projeto RADAM/BRASIL SB-20-ZB Ponto 15, 15 July 1976 (fl, fr), *J. Ramos, J. Geraldo & L. Coêlho s.n.* (holotype, INPA-62163). Figure 2.

Species ejusdem generis pilis in sicco pallidis ornata, foliis ovatis subtus perduranter pubescentibus nervationem tertiariam reticulatam praebentibus, nervis secundariis basalibus dissimilibus isdem distalibus, parte connata stylorum perspicue breviore stigmatibus, bracteis cymularum masculinarum pari singulario glandium instructis.

Shrub, 1 m. Indumentum pale. Leaves ovate, up to 8 cm long, 4.5 cm wide, basally obtuse to rounded, apically acute; adaxially pubescent to glabrous, abaxially persistently pubescent; secondary veins 7–9 pairs, basal one differing from distal ones in length and angle of divergence, tertiary venation reticulate; 1–2 laminar glands on each half of blade, basally one large abaxial pair of glands (diameter 1 mm each); petioles 2–4 cm long. Stipules 0.5 mm long. Thyrses at least 6 cm long, bracts of secondary branches 1.5–2.5 mm long. Each branch bearing 1–2 female flowers and ± 25 male cymules. Bracts of male cymules with one pair of glands. Pistillate flower in the axil of a 2-mm-long bract. Pedicel 1 mm long; sepals 1.0–1.5 mm long, 1 mm wide, not ciliate, sometimes with glands; style 0.5–0.7 mm long, clearly shorter than stigmas. Fruits 6 mm long, sparsely pubescent. Seeds 4 mm long, 3 mm wide, with large caruncle.

Dendrothrix wurdackii is known only from the type collection, which was distributed as *Mabea* sp. More collections may exist, but have probably been distributed under different names.

Ecological data of this species are not known. It differs from the other two species predominantly in characters of its leaves. Besides the characters listed in the key it is distinguished by the short styles and the large basal leaf glands, as well as the obtuse to rounded leaf base.

The name of the species honors Kenneth J. Wurdack, who, independently of me, recognized this new species as well as its affinities.

3. Dendrothrix yutajensis (Jablonski) Esser, comb. nov. Basionym: *Sapium yutajense* Jablonski, Mem. New York Bot. Gard. 17: 184. 1967, fig. 24. *Senefeldera yutajensis* (Jablonski) Webster, Ann. Missouri Bot. Gard. 76: 958. 1989. *Senefelderopsis yutajensis* (Jablonski) Mennega *in* Kruijt, Monographic Studies on *Sapium*. Doctoral Thesis, Rijksuniversiteit te Utrecht: 201. 1989. TYPE: Venezuela. Territorio Federal Amazonas: Caño Yutajé, 1,600 m, 15 Feb. 1953 (fl, fr), *B. & C. K. Maguire 35261* (holotype, NY). Figure 3.

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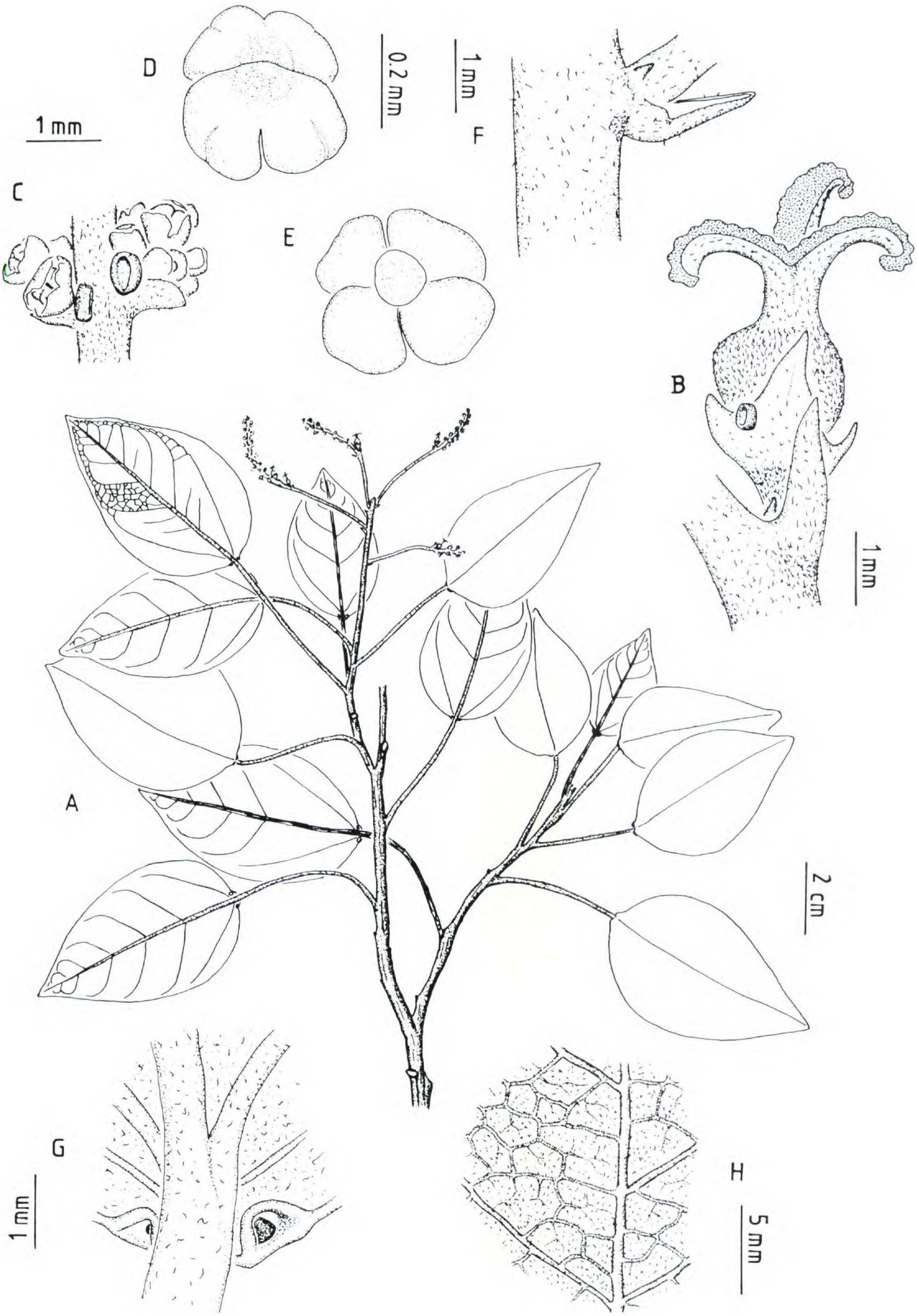
Figure 2. *Dendrothrix wurdackii* Esser. —A. Habit. —B. Pistillate flower. —C. Portion of staminate part of inflorescence showing two cymules. —D. Androecium, dorsal view. —E. Androecium without filaments, ventral view. —F. Bract of secondary thyrse with bracteoles. —G. Leaf base showing glands, abaxial view. —H. Detail of reticulate leaf venation. (All drawn from *Ramos et al. s.n.*)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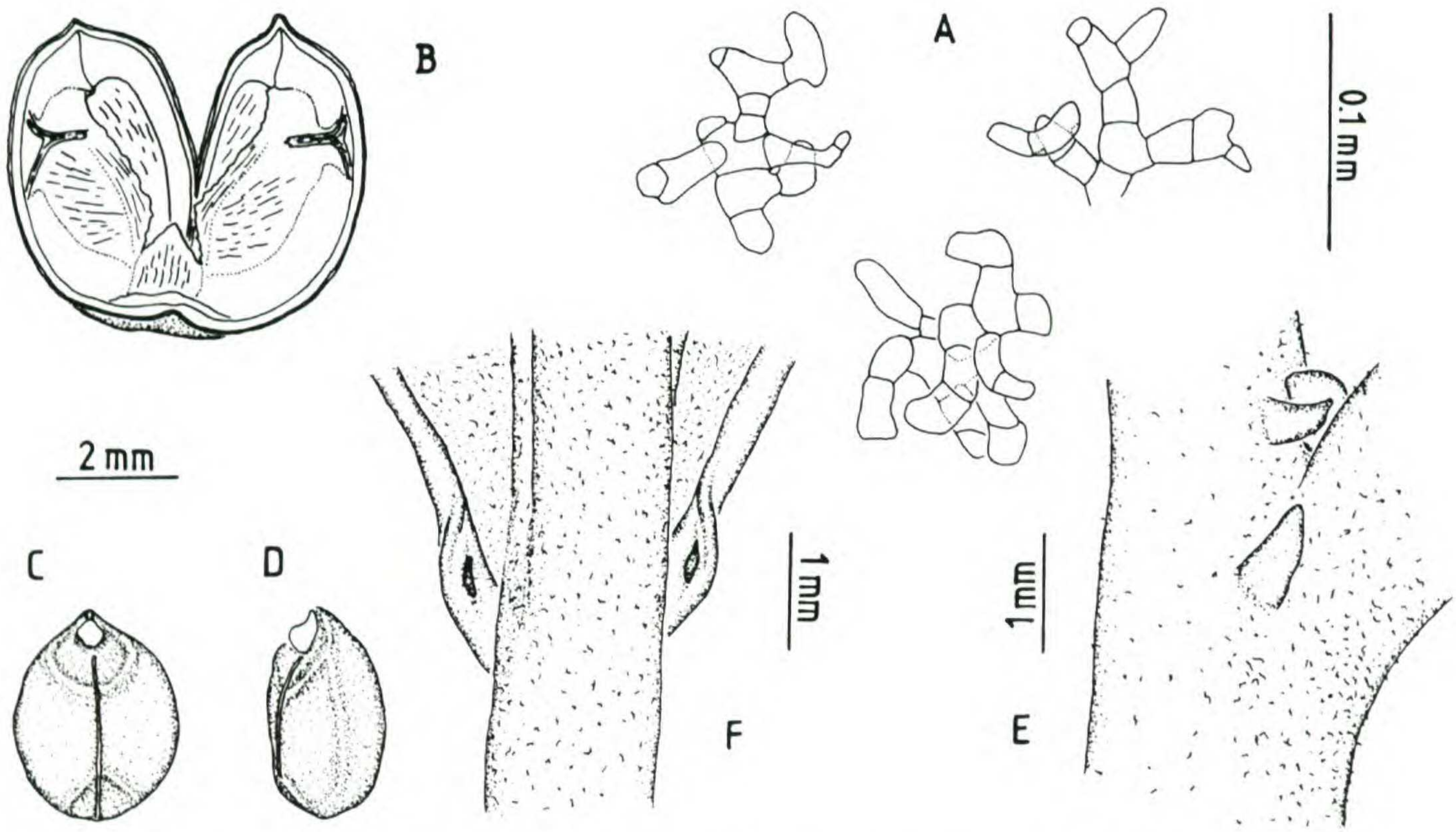

Figure 3. *Dendrothrix yutajensis* (Jablonski) Esser. —A. Hairs, upper view. —B. Mericarp, ventral view. —C. Seed, ventral view. —D. Seed, lateral view. —E. Detail of vegetative shoot showing stipule. —F. Leaf base showing glands, abaxial view. (A–D drawn from *Amaral 1523;* E, F drawn from *Rosa & Lira 2293.*)

Jablonski (1965: 176) had correctly cited the collection *Maguire et al. 30964* as *Senefelderopsis chiribiquetensis* (R. Schultes & Croizat) Steyermark. Two years later he erroneously made the same specimen one of the paratypes of his *Sapium yutajense*. Fortunately, his excellent drawings and the well-written description unequivocally refer to *Dendrothrix yutajensis*. The original description now has to be expanded:

Hairs always reddish. Leaves abaxially with 0–3 laminar and a pair of basimarginal glands (diameter less than 0.5 mm). Stipules persistent, squamiform, less than 1 mm long. Sepals of female flowers not ciliate. Style 1.5–2.0 mm long, exceeding length of stigmas. Seeds 3.5–4.0 mm long, 2.5 mm wide. Pollen grains 22 μm long, tectum perforate, exine psilate.

Distribution and phenology. Endemic to the Guayana Highland of Venezuela and Brazil, unknown from its western and eastern portion, and occasional to frequent in campos and thickets; flowering in November, January to March, May, fruits collected in February.

The most conspicuous difference between this species and the other two of the genus is the indumentum, which consists of reddish and quite firm hairs; within the Euphorbiaceae they are only comparable to those of *Mabea* Aublet.

Additional specimens examined. BRAZIL. **Amazonas:** Mun. Barcelos, Platô da Serra Aracá, parte SE da Serra Norte, alt. 1,150–1,250 m, 12 Feb. 1984 (fl, fr), *I. L. do Amaral 1523* (INPA, NY); plateau of northern massif of Serra Aracá, N part of Northern mountain near peak, alt. 1,400 m, 17 Feb. 1984 (fr), *G. T. Prance et al. 29140* (MG); Arredores do R. da Serra Aracá, 29 Jan. 1978 (imm. fr), *N. A. Rosa & S. B. Lira 2293* (MG). VENEZUELA. **Territorio Federal Amazonas:** Depto. Río Negro, Cerro de La Neblina Camp IV, 15 km NNE of Pico Phelps, alt. 780 m, 15–18 Mar. 1984 (fl), *R. Liesner 16685* (HBG); Serranía Yutaje, Río Manapiare, in right branch of Caño Yutaje, alt. 1,400 m, 9 Feb. 1953 (fl), *B. & C. K. Maguire 35103* (COL); Cerro de La Neblina, Río Yatua, banks of Cañon Grande E of Cumbre Camp, alt. 1,100 m, 24 Nov. 1957 (imm. fl), *B. Maguire et al. 42212* (U); Cerro Yapacana, en la cumbre, alt. 1,000–1,200 m, 5–7 May 1970 (fl), *J. A. Steyermark & G. S. Bunting 103143* (U). **Bolívar:** Distr. Heres, Cerro Marutani, piedra arenisca en la altiplanicie a lo largo del río Carla, alt. 1,200 m, 11–14 Jan. 1981 (imm. fr), *J. A. Steyermark et al. 123920* (NY).

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